

Compact Optical Inertial Tracking for Launch Vehicles, Phase I

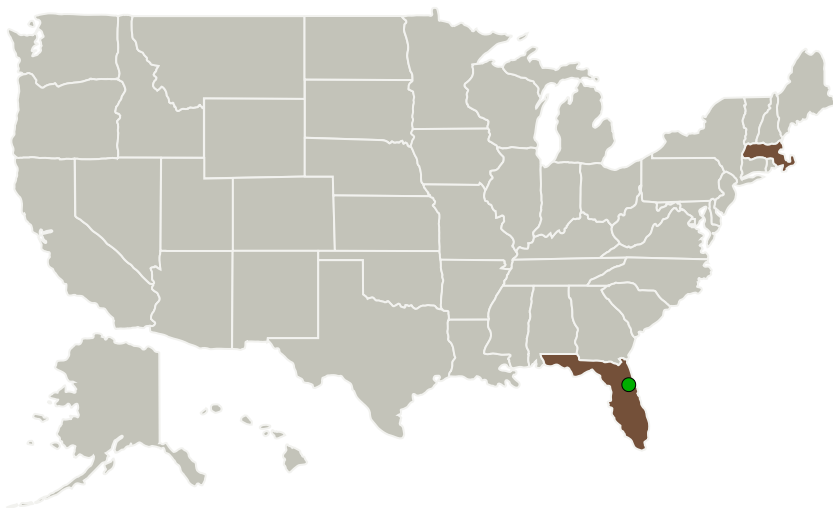
Completed Technology Project (2012 - 2012)




Project Introduction

We propose a method for developing a miniature all-optical Inertial Navigation System. In an optical INS, the rotation sensitivity depends on the area enclosed by a circular optical path, so it is impossible to significantly reduce the size of a standard fiber optic gyroscope or ring laser gyroscope without sacrificing sensitivity. However, using the phenomenon of fast light, which we will produce through Stimulated Brillouin Scattering in a fiber, the sensitivity of a ring laser gyro of a given size can be enhanced by up to 106. We will use a fiber-based, fast-light enhanced ring laser gyroscope to maintain the sensitivity of existing optical gyroscopes while greatly reducing the physical size of the sensing element. Combined with photonic integrated circuit technologies and standard optical accelerometers, the entire INS package can be greatly reduced in size, weight, and power, resulting in a rugged, compact, high sensitivity INS ideal for launch vehicles and spacecraft.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
MagiQ Technologies, Inc.	Lead Organization	Industry	Somerville, Massachusetts
 Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida



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Primary U.S. Work Locations

Florida

Massachusetts

Project Transitions

 **February 2012:** Project Start

 **August 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138048>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MagiQ Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

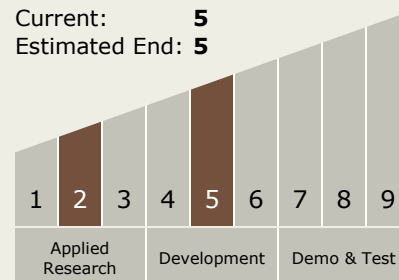
Carlos Torrez

Principal Investigator:

Caleb A Christensen

Technology Maturity (TRL)

Start: 2
Current: 5
Estimated End: 5



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
 - └ TX13.1 Infrastructure Optimization
 - └ TX13.1.2 Launch/Test/Ops Site Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System